

HOST-PARASITE RELATIONSHIPS OF  
CALIFORNIA TORTRICINAE

(Lepidoptera: Tortricidae)

JERRY A. POWELL

*University of California, Berkeley*

During the past four years a number of parasite records have accumulated as a result of rearing done in connection with biological studies on California Tortricine moths. A detailed taxonomic and biological treatment is planned, but it is felt that a separate presentation of the parasite data is appropriate.

Rearing was accomplished primarily through field collection of near mature larvae which were kept in the laboratory on cut host plant leaves. Due to the scope of the study, individual larvae were not kept in separate containers except when small numbers were involved. Consequently specific data on habits of the parasites were not taken in most cases.

The Ichneumonidae comprise the most common group of parasites of North American Tortricinae, at least in terms of recorded host-parasite relationships; and this group was most frequently encountered during the present investigation. Townes and Townes (1951) state that host selection by Ichneumonids is sometimes restricted, but commonly it is related to the habitat of the exploring female; and a variety of species which occur there may be utilized. My data concern small, naked caterpillars in leaf shelters, and the records tend to support the Townes' generalization. For example, six Ichneumonid species were reared from *Croesia albicomana* on rose bushes at Pleasant Hill, Contra Costa County. These were: three Ophioninae, *Campoplex* sp. nr. *atridens*, *Horogenes pterophorae*, and *H. eureka*; two Ephialtinae, *Itoplectis quadricingulatus* and *Scambus tecumseh*; and one Metopiinae, *Triclistus emarginalus*. Three of these species, the first and last two named, were also reared from *Archips argyrospilus* from oak trees at the same locality. In addition, a second Metopiine, *Exochus nigripalpis subobscurus*, was reared from *Archips* but not from *Croesia*. Some of these same parasites were encountered at other localities in the San Francisco Bay area. *Horogenes pterophorae*, which has been recorded previously from diverse groups of Lepidoptera, was reared from *Acleris variegana* on garden rose at Albany, Alameda County. Similarly, *Horogenes eureka* proved to be an ubiquitous parasite species in my rearings, appearing in

association with *Croesia albicomana* on wild rose and an unidentified Gelechiid on *Artemisia* at El Sobrante, Contra Costa County; with another unidentified Gelechiid on *Quercus agrifolia* and a Tortricoid, presumably *Epinotia crenana* (Hübner), on willow on the University of California, Berkeley campus; as well as with both *Acleris variegana* and *Pandemis pyrusana* on two ornamental plants at San Lorenzo, Alameda County. The latter two host rearings also produced *Exochus nigripalpis subobscurus*, which previously has been associated only with Tortricine and Sparganothine Tortricids in California. In addition, the same parasite was reared from *Cnephasia longana* on poppy near Castro Valley, Alameda County and from *Argyrotaenia franciscana* in San Francisco on *Scrophularia*, in quite a different ecological situation, the coastal fog-belt zone, one which tends to segregate species of Tortricinae.

Members of seven subfamilies of Ichneumonidae are recorded as parasites of Tortricinae in North America (Townes & Townes, 1951), and of these, all but the Ichneumoninae are represented in the present data. Summaries of the biologies of these groups given by the Townes' (1951, 1959, 1960), together with the number of records accumulated on California Tortricinae during the current investigation (shown in parentheses) are as follows: Ephialtinae; Pimplini (3), the Scambus group are parasitic on larvae in plant tissues (buds, leaf-rolls, etc.) and oviposition occurs through the plant tissue to reach the host; Ephialtini (1) are internal parasites of pupae, usually exposed or semi-exposed Lepidoptera pupae, with oviposition into pupae or prepupae and emergence from pupae. Tryphoninae (2) attach their eggs to host caterpillars by stalks, and the parasite larva completes development in the host cocoon; their hosts are mostly sawflies, but Phytodietini, the Tribe represented by my records, parasitize mostly Lepidoptera. Gelinae (1) are said to ovipost in various small cocoons, including those of primary parasites and spider eggs. Banchinae (6) are internal parasites of caterpillars, very often Tortricidae. Metopiinae (10) ovipost into host larvae, primarily Pyraloids and Tortricoids usually well before maturity of the host, and emerge from the pupae, cutting off a cap-like lid from the head of the host pupal shell. Most species of Ophiioninae (13) are parasitic on Lepidopterous larvae, including diverse groups, but commonly of Tortricids; my data suggest that the

hosts normally cease development in the penultimate or antepenultimate instar, their remains occurring at the posterior end of the Ichneumonid cocoon.

Records given by Muesebeck and Walkley (1951) suggest that Braconidae are common parasites of North American Tortricinae. However, Braconids were reared only occasionally during the present study, although frequently they were encountered on other Lepidoptera at the same localities. A large proportion of the records given by Muesebeck and Walkley are for common, widespread Tortricine species. It may be that these data have accumulated primarily through efforts of investigators rearing large numbers and working with dense populations of economically important species. This is not to suggest that Braconids are present only in small proportions, but it may be that gregarious habits of many of them are better suited to establishment in situations of dense host population. For example, Basinger (1935, 1938) listed twelve parasites of *Argyrotaenia citrana* in southern California, of which the two most important in citrus orchards were the Braconids, *Apanteles aristoteliae* Viereck and *Hormius basalis* (Provancher); and Benedict (present data) found the latter to be present in *A. citrana* populations in apple orchards in central California. However, numerous occasional rearings of *A. citrana* and the closely related *A. franciscana* from ornamental and native plants in the San Francisco Bay area during the past four years have not produced any Braconids. In each case cited below where Braconids were reared during the present study, the collection was made from a host colony of dense larval concentration.

Parasitism by Chalcidoidea involves species which are relatively host specific as well as others which are only incidentally associated. Most Chalcidoid wasps which I reared appeared as incidental individuals. The record of *Copidosoma* sp. (Encyrtidae) reared from a larva of *Cnephasia longana* near Orinda, Contra Costa County, is of interest because the host is an introduced species, and members of *Copidosoma* are usually thought to be rather host specific.

Tachinid flies are common parasites of Tortricine moths, but for the most part their association appears to be of minor importance. *Phorocera tortricis* Coquillett, which was reared from *Archips cerasivoranus* near Mt. Shasta, Siskiyou County, has been recorded only from Tortricinae (Aldrich & Webber, 1924). In

contrast, *Actia interruta* Curran has been recovered from various hosts at several localities in central California. It was found to be an occasional parasite of *Croesia albicomana* at El Sobrante and at Pleasant Hill, of *Archips argyrospilus* as well as the Sparganothine Tortricid, *Amorbia cuneana* (Walsingham). Also in urban situations, I have reared it from *Acleris variegana* at San Lorenzo, and from an unidentified Tortricoid on willow (probably *Epinotia crenana* Hübner) at Berkeley. It was also obtained in numbers from *E. emarginana* (Walsingham) on manzanita in a native situation near Booneville, Mendocino County in June 1957.

The parasite specimens cited below are deposited in the collection of the California Insect Survey, University of California, Berkeley, and the Canadian National Collection, Ottawa. Host identifications were made through associated, reared adults. Unless otherwise indicated, the collection records are my own.

#### Tribe TORTRICINI

##### ACLERIS VARIEGANA (Schifferrmüller)

###### Braconidae:

*Apanteles* sp.; 1 ♂ ex larvae collected at San Lorenzo, Alameda County on *Pyracantha*, August 6, 1960, emerged August 25 (JAP-60H1).

*Apanteles* sp. nr. *aristoteliae* Viereck; 1 ♀ same data as preceding; 2 ♂ ex larvae collected at San Lorenzo on *Prunus avium*, August 19, 1960, emerged September 4 and 7. These Tortricine larvae were a mixed lot consisting primarily of *A. variegana*, but with a few *Argyrotaenia citrana* and *Pandemis pyrusana* (JAP-60H4).

###### Ichneumonidae:

*Phytodietus* sp.; 1 ♂ ex larva collected at San Lorenzo on *Rubus vitifolia*, August 19, 1960, emerged September 10 (JAP-60H6); emergence occurred through a ragged, subapical cut in the wasp cocoon, which had associated the remains of a last instar host larva near the emergence end; 1 ♂, 1 ♀ ex larvae with same data as above mentioned mixed lot on *Prunus*, emerged September 8 and "September" (JAP-60H4).

*Gelis* "sp. A"; 1 ♂ reared from a mixed lot similar to preceding, collected September 11, 1960 (P. D. Hurd, Jr.), emerged September 20.

*Exochus nigripalpis subobscurus* Townes; 1 ♂ ex pupa from larvae collected at San Lorenzo on *Pyracantha*, August 6, 1960,

emerged September 11 (JAP-60H1); 2♂ ex pupae from larvae collected at San Lorenzo, August 6 and 19, 1960, with the same data as above mentioned mixed lot, emerged August 26 and September 8 (JAP-60H3, 4).

*Horogenes eureka* (Ashmead); 1♂, 1♀ ex larvae collected at San Lorenzo on *Pyracantha*, August 6 and 19, 1960, emerged August 22 and 31 respectively (JAP-60H1); the two cocoons associated with host larval remains of two instars, presumably penultimate and antepenultimate; 6♂, 6♀ ex larvae collected at San Lorenzo with same data as above mixed lot, emerged August 16 to September 7 (JAP-60H3, 4); cocoons associated with the same two host instars as in preceding, the host remains being located near the posterior end of the wasp cocoons; 2♀ ex larvae from similar mixed lot, collected September 11, 1960 (P. D. Hurd, Jr.), emerged September 18 and 20.

*Horogenes pterophorae* (Ashmead); 1♂ ex larva collected at Albany, Alameda County, on garden rose, May 21, 1957; host remains of immature (penultimate?) instar.

#### Tachinidae:

*Actia interrupta* Curran; 1♀ ex larva collected at San Lorenzo on *Prunus avium*, August 6, 1960, emerged August 16 (JAP-60H3); an associated head capsule indicates that host probably died soon after moulting to final instar.

#### CROESIA ALBICOMANA (Clemens)

#### Chalcididae:

*Spilochalcis* sp.; 2♀ ex pupae collected at Pleasant Hill, Contra Costa County, on *Rosa californica*, May 19, 1958, emerged in late May.

#### Ichneumonidae:

*Scambus tecumseh* Viereck; 1♂ ex pupa collected at Pleasant Hill on garden rose, May 5, 1957; 1♂ ex pupa collected at Pleasant Hill on *Rosa californica*, May 19, 1958, emerged in late May.

*Itoplectis quadricingulatus* (Provancher); 1♀ ex pupa, same data as preceding.

*Triclistus emarginalus* (Say); 1♂ ex pupa collected at Pleasant Hill on garden rose, May 5, 1957, emerged after June 15.

*Campoplex* sp. nr. *atridens* Townes; 1♂ ex pupa, same data as preceding, emerged May 14.

*Horogenes eureka* (Ashmead); 1♂ ex larva collected at Pleasant Hill on garden rose, April 1, 1957 (W. E. Ferguson), emerged

April 12 (JAP-57D1); 1 ♂, 2 ♀ ex larvae collected at El Sobrante, Contra Costa County on *Rosa californica*, April 26, 1958, emerged in May (JAP-58D14).

*Horogenes pterophorae* (Ashmead); 1 ♂ ex larva collected at Pleasant Hill on garden rose, April 1, 1957 (W. E. Ferguson), emerged in late April (JAP-57D1).

Tachinidae:

*Actia interrupta* Curran; 1 ♂ ex larva collected at El Sobrante on *Rosa californica*, March 8, 1958, emerged in April (JAP-58C1); parasitization in this instance occurred early, since only small host larvae, presumably second and third instar, were collected on this date.

Tribe CNEPHASIINI

CNEPHASIA LONGANA (Haworth)

Encyrtidae:

*Copidosoma* sp.; a number of individuals from a mummified larva, collected 2 miles east of Orinda, Contra Costa County, on *Eschscholtzia californica*, May 11, 1958, emerged in late May (JAP-58E8).

Ichneumonidae:

*Exochus nigripalpis subobscurus* Townes; 1 ♀ ex larva collected 4 miles east of Castro Valley, Alameda County, on *Eschscholtzia californica*, May 11, 1958, emerged in late May (JAP-58E9).

Tribe ARCHIPSINI

ARCHIPS CERASIVORANUS (Fitch)

Braconidae:

*Chelonus* sp.; 2 ♀ ex tent colony of larvae collected 5 miles east of McCloud, Siskiyou County, on *Prunus emarginata*, June 21, 1958, emerged in July (JAP-58F4).

Tachinidae:

*Phorocera tortricis* Coquillett; 1 ♂ ex tent colony, same data as preceding, emerged July 11.

*Phorocera sternalis* (Coquillett); 1 ♂ ex same tent colony as preceding, emerged in July. Subsequent examination of the tent revealed a dipterous puparium near the apex of the tent with the anterior parts of a small last instar *Archips* larva.

ARCHIPS ARGYROSPILUS (Walker)

Chalcididae:

*Brachymeria ovata* (Say); 1 ♀ ex pupa collected at Linden,

San Joaquin County, on *Juglans*, emerged May 12, 1954 (E. Oatman).

Ichneumonidae:

*Scambus tecumseh* Viereck; 1 ♂ ex pupa from larva collected at Pleasant Hill, Contra Costa County, on *Quercus lobata*, May 5, 1957, emerged May 14.

*Triclistus emarginatus* (Say); 2 ♂, 1 ♀ ex pupae from larvae collected at Pleasant Hill on *Quercus lobata*, April 20, 1957, emerged May 16 and 17 (W. E. Ferguson).

*Exochus nigripalpis subobscurus* Townes; 1 ♂ ex pupa from larva collected at Pleasant Hill on *Quercus lobata*, May 5, 1957, emerged by June 15.

*Campoplex* sp. nr. *atridens* Townes; 1 ♀ ex larva, same data as preceding, emerged May 18; host appears to have ceased development in penultimate instar, according to associated larval remains.

Tachinidae:

*Aplomya caesar* Aldrich; 1 ♂, 1 ♀ ex pupae, from Linden, San Joaquin County, on *Juglans*, May 12, 1954 (E. Oatman); 1 ♂ ex pupa, from Brentwood, Contra Costa County, April 24, 1956, emerged May 12 (F. H. Rindge).

*Actia interrupta* Curran; 1 ♂ ex collection from Berkeley, Alameda County, May 10, 1946, emerged May 27 (F. H. Rindge); 1 ♂ ex larva collected at Pleasant Hill, Contra Costa County, on *Quercus lobata*, May 5, 1957, emerged May 19.

CHORISTONEURA FUMIFERANA (Clemens)

Braconidae:

*Apanteles* sp. nr. *californicus* Muesebeck; 1 ♂ ex larva collected at Lily Lake, 7 miles east of Pine Creek, Modoc County, on *Abies concolor*, July 11, 1957, emerged in late July (JAP-57G3).

Tachinidae:

*Ceromasia* sp.; 1 ♂ ex larva, same data as preceding, emerged July 30.

CHORISTONEURA HOUSTONANA (Grote)

A species of Chalcidoidea was found to have destroyed nearly every larva of *C. houstonana* near Acton, Los Angeles County, May 20, 1959. Parasite pupae were collected but most failed to emerge, probably due to dessication. The only parasite reared

was *Tetrastichus coerluescens* Ashmead (Eulophidae), which probably was a secondary associate according to Dr. Burks.

Ichneumonidae:

*Glypta* sp.; 1 ♂, 1 ♀ ex larvae collected at Hungry Valley (5 miles south of Gorman), Ventura County, on *Juniperus californicus*, May 4, 1959, emerged June 3 and 10 (JAP-59E1); 1 ♂ ex larva collected at Hungry Valley, May 29, 1959, emerged June 18 (JAP-59E8).

*Campoplex* sp. nr. *hyalinus* (Provancher); 4 ♀ ex larvae collected at Hungry Valley on *Juniperus*, May 4, 1959, emerged before May 30 (JAP-59E1); 1 ♀ ex larva collected 4 miles northwest of Acton, Los Angeles County, on *Juniperus californicus*, May 20, 1959, emerged before June 1. Parasite cocoons were found to have been constructed when host larvae had reached the penultimate instar, according to head capsule measurements and color. Pupation of the parasite occurred near the exit of the tube-like host shelter, and remains of the moth larva were located head inward, at the posterior end of the wasp cocoon.

*Pristomerus* sp.; 1 ♀ ex mass rearing material collected at Hungry Valley on *Juniperus californicus*, May 19, 1959, emerged June 10 (JAP-59E4).

ARGYROTAENIA NISCANA (Kearfott)

Ichneumonidae:

*Glypta* sp.; 3 ♂ ex larvae collected at Bouquet Canyon, Los Angeles County, on *Adenostoma fasciculatum*, May 19, 1959, emerged June 6, "June" (JAP-59E5).

ARGYROTAENIA FRANCISCANA (Walsingham)

Ichneumonidae:

*Campoplex* sp.; 1 ♀ ex larva collected at San Francisco (Strawberry Hill), on *Scrophularia californica*, April 8, 1959, emerged April 24.

*Glypta* sp.; 2 ♀ ex larvae, same data as preceding, emerged April 24, "May".

*Exochus nigripalpus subobscurus* Townes; 1 ♂ ex larva, same data as preceding, emerged April 24.

ARGYROTAENIA CITRANA (Fernald)

Braconidae:

*Hormius basalis* (Provancher); 6 ♂, ♀ ex collections from Sebastopol, Sonoma County, on *Malus*, May 9, 1949 (S. H. Benedict).



## Ichneumonidae:

*Glypta* sp.; 1 ♀ ex larva collected at San Pablo, Contra Costa County, on garden rose, March 1, 1959, emerged March 18 (JAP-59C1); the parasitized larva was collected as a last instar, and the wasp spun a very loose, thin (relative to Ophioninae), cellophane-like cocoon by March 8.

*Exochus nigripalpis subobscurus* Townes; 1 ♂ ex collection from Sebastopol on *Malus*, April 24, 1949 (S. H. Benedict).

## CLEPSIS FUCANA (Walsingham)

## Ichneumonidae:

*Glypta* sp.; 1 ♀ ex larva collected at San Francisco (Strawberry Hill), on *Scrophularia californica*, March 18, 1958, emerged in April (JAP-58C19).

## PANDEMIS PYRUSANA Kearfott

## Ichneumonidae:

*Exochus nigripalpis subobscurus* Townes; 1 ♂ ex pupa from larva collected at San Lorenzo, Alameda County, on *Prunus avium*, August 6, 1960, emerged August 29 (JAP-60H3); 1 ♂ ex pupa from larva collected at San Lorenzo, August 19, 1960, emerged September 1 (JAP-60H4).

Acknowledgment is made to W. E. Ferguson and P. D. Hurd, Jr., for assistance with observations and collections at Pleasant Hill and San Leandro (=San Lorenzo), and to the latter, whose cooperation permitted field research in connection with California Insect Survey activities. Determination of parasites was kindly provided by B. D. Burks, U.S. National Museum and R. L. Doutt, University of California, Albany (Chalcidoidea); W. R. Mason (Braconidae), L. K. Smith and G. S. Walley (Ichneumonidae), Entomology Research Institute, Ottawa; and H. J. Reinhard, Texas A. & M. College (Tachinidae).

## LITERATURE CITED

## ALDRICH, J. M. AND R. T. WEBBER

1924. The North American species of parasitic two-winged flies belonging to the Genus *Phorocera* and allied genera. Proc. U.S. Nat'l. Mus., 63 1-90.

## BASINGER, A. J.

1935. Parasites reared from *Argyrotaenia* (*Tortrix*) *citrana* Fernald. Calif. Dept. Agric. Mo. Bull., 24(2): 233.
1938. The orange tortrix, *Argyrotaenia citrana* Fernald. Hilgardia, 11(11): 635-669.

MUESEBECK, C. W. F. AND L. M. WALKLEY

1951. Braconidae, *in*: Muesebeck, Krombein and Townes, U.S. Dept. Agric., Agric. Monogr., 2: 90-184.

TOWNES, H. AND M. TOWNES

1951. Family Ichneumonidae, *in*: Muesebeck, Krombein and Townes, U.S. Dept. Agric., Agric. Monogr., 2: 184-410.

1959. Ichneumon-flies of America North of Mexico: I. Subfamily Metopiinae. U.S. Nat'l. Mus., Bull. 216(1), x + 318 pp.

1960. *Ibid.*, 2. Subfamilies Ephialtinae, Xoridinae, Acaentinae. U.S. Nat'l. Mus., Bull. 216(2), vii + 676 pp.

---

A HOST OF CHRYSIS (TRICHRYSIS)  
MUCRONATA BRULLÉ AND AN ADDITIONAL HOST OF  
CHRYSIS (CHRYSIS) COERULANS FABRICIUS

(Hymenoptera: Chrysididae)

Several specimens of *Trypoxylon (Trypargilum) tridentatum* Packard and *Ancistrocerus tuberculocephalus sutterianus* (Sausure) were reared from old mud nests of *Sceliphron caementarium* (Drury). The mud nests were collected from the underside of several cement bridges in the vicinity of Davis, California, during the winter of 1959-60.

Four male and four female specimens of *T. tridentatum* emerged from the nests. One of the *Trypoxylon* cells was occupied by a female of *Chrysis (Trichrysis) mucronata* Bd. (det. R. M. Bohart). The chrysidid was in the bottom cell of a two-cell series.

Thirty-seven male and forty-three female specimens of *A. t. sutterianus* emerged from the nests. Two females of *Chrysis (Chrysis) coerulans* F. (det. C. G. Moore) were found in the *Ancistrocerus* cells.

Bodenstein<sup>1</sup> listed no host for *C. mucronata* and apparently this is the first known host record. Krombein<sup>2</sup> recorded three other species of *Ancistrocerus* as hosts of *C. coerulans*.—F. D. PARKER, *University of California, Davis*.

---

<sup>1</sup>Bodenstein, W. G. 1951. Family Chrysididae. In Muesebeck, C. F. W., et al., Hymenoptera of America north of Mexico, synoptic catalog. U.S. Dept. Agr., Agr. Monog. no. 2, pp. 718-726.

<sup>2</sup>Krombein, K. V. 1958. Family Chrysididae. Hymenoptera of America north of Mexico, synoptic catalog. First supplement. pp 94-97.